Fragmentation of 160 A GeV Pb in Various Targets*

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A substantial fraction of ultrarelativistic heavy ion collisions results in fragmentation of projectile nuclei in peripheral collisions involving both nuclear and electromagnetic interactions. These reactions are intrinsically of interest, as an aspect of ultrarelativistic nucleus-nucleus interactions which is not thoroughly understood. Moreover, measurements of cross sections for fragmentation are needed in studies of cosmic ray propagation. Measurements of some of these cross sections have been previously made using beams of 14.5 A GeV ^{28}Si and 11.4 A GeV ^{197}Au at BNL AGS, and 60 and 200 A GeV ^{18}O and 200 A GeV ^{32}S at CERN SPS. In this paper, we shall report new measurements using the beam of 160 A GeV ^{208}Pb at CERN SPS.

We exposed 10 stacks of BP-1 glass stacks that were sandwiched with various targets to the beam of 160 A GeV Pb in December 1994. The exposure was carried out at normal incidence at a density of ~ 800 cm^{-2}. The dimension of each plate of BP-1 glass was 50 mm x 50 mm x 1 mm. We etched the glass in 70% CH_3SO_3H at 50°C for 120 hours. The charge threshold is $Z_{th} \sim 68$.

We typically obtain ~ 1.5×10^4 events in each stack. The charge resolution is ~ 0.14 charge unit. The charge resolution can even be improved by multiple measurements of etch pits in several sheets of BP-1 detectors. We present the charge distribution of beam particles and projectile fragments obtained in 5 sheets of glass in the figure. The charge resolution is found to be ~ 0.06 charge unit. This charge resolution is more than adequate to identify fragments and hence to measure cross sections for charge-changing interactions. The measurements of fragmentation cross section of 160 A GeV Pb in various targets are presented.

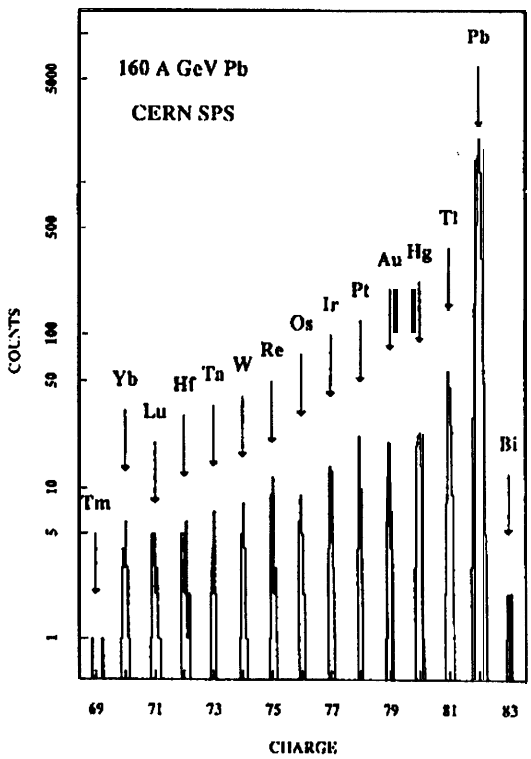

Figure – The distribution of averaged charges from 5 sheets of BP-1 detectors for beam particles and projectile fragments created in collisions of 160 A GeV Pb with target.

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